Claims

1. Piezoelectric actuator (1) comprising

- a stack of a plurality of individual piezoelectric actuator elements (2, 2´, 2´´), which are disposed between inner electrodes (3, 3´, 3´´) and which contract or expand in a main oscillation direction (10) in dependence on an applied electric voltage,
- a first metallization strip (4) and a second metallization strip (5), the inner electrodes (3, 3´, 3´´) being respectively connected in an alternating manner to the first or second metallization strip (4) (5),
- a first outer electrode (6) and a second outer electrode (7) which are respectively fixed to the first or the second metallization strip (4) (5) in order to electrically contact the piezoelectric actuator (1) and
- a first connection element (8) and a second connection element (9) for externally contacting the piezoelectric actuator (1) which are respectively connected to the first or the second outer electrode (6) (7),

whereby

- the outer electrodes (6) (7) comprise at least one region which is embodied in such a way that it compensates length variations of the piezoelectric actuator (1) in the main oscillation direction (10) as a result of its design and arrangement by means of elastic deformation exclusively inside a plane which is parallel to the main oscillation direction (10), and
- the outer electrodes (6) (7) have a comb-shaped profile with contact teeth (11) (11´) to contact the metallization strips (4) (5)

c h a r a c t e r i z e d i n t h a t

the outer electrodes (6) (7) have a wave-form conductor plate (16) (16´) from which the contact teeth (11) lead away.

2. Piezoelectric actuator (1) according to Claim 1,
c h a r a c t e r i z e d i n t h a t
the wave-form conductor plate tapers along its principal axis (18) (18´).

3. Piezoelectric actuator (1) according to Claim 1 or 2,
c h a r a c t e r i z e d i n t h a t
the contact teeth (11) (11´) run parallel to each other and are all the same length at a first end (12) (12´) and the contact teeth (11) (11´) at this end (12) (12´) are soldered to the metallization strips (4) (5) in order to create an electrical contact.

4. Piezoelectric actuator (1) according to one of Claims 1 to 3,
c h a r a c t e r i z e d i n t h a t
the outer electrodes (6) (7) are curved at an angle $\alpha < 90°$ in order to be fixed to the piezoelectric actuator (1), parallel to the first, straight end region (12) (12´) of the contact teeth (11) (11´).

5. Piezoelectric actuator (1) according to one of Claims 1 to 4,
c h a r a c t e r i z e d i n t h a t
the outer electrodes (6) (7) on the piezoelectric actuator (1) are fixed mechanically by means of an adhesive (14) to the piezoelectric actuator (1) and the contact teeth (11) (11´) are left open when the adhesive (14) is applied for soldering to the metallization strips (4) (5).

6. Piezoelectric actuator (1) according to Claim 5,

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c h a r a c t e r i z e d i n t h a t
the adhesive (14) is designed and arranged in such a way that electric insulation is ensured between the outer electrodes (6) (7) on the one hand and the piezoelectric actuator elements (2, 2´, 2´´) and the inner electrodes (3, 3´, 3´´) on the other hand.

7. Piezoelectric actuator (1) according to Claim 5 or 6,
c h a r a c t e r i z e d i n t h a t
the thickness of the layer of adhesive (14) between the outer electrodes (6) (7) on the one hand and the piezoelectric actuator elements (2, 2´, 2´´) and the inner electrodes (3, 3´, 3´´) on the other hand is determined by the admixture of particles of a preset size.

8. Piezoelectric actuator (1) according to one of Claims 5 to 7,
c h a r a c t e r i z e d i n t h a t
the adhesive (14) is fuel-resistant.

9. Piezoelectric actuator (1) according to one of the preceding claims,
c h a r a c t e r i z e d i n t h a t
the piezoelectric actuator (1) is completely covered with adhesive (14).

10. Piezoelectric actuator (1) according to one of the preceding claims,
c h a r a c t e r i z e d i n t h a t
the outer electrodes (6) (7) are made from a bronze alloy using etching.